ASM Materials Education Foundation

Mission

“To excite young people in materials, science, and engineering careers.”

Report to University Materials Council

Charles R. Hayes
Executive Director
EDUCATIONAL OUTREACH

• Materials Camp®
  • Undergraduate Design Competition
  • Under Graduate Scholarships
  • Yearbook of MSE programs
  • Student Chapter Grants
  • Podcasts
  • City of Materials
  • K-12 teacher Grants
  • “LeaderShape” ethical leadership skills
TARGET AUDIENCES

• High school students
• High school teachers
ASM Materials Camp®
Number of Participants
Total Thru 2009: 7,487 (Students: 5,127; Teachers: 2,360)
MATERIALS CAMP® - Teachers

TO DATE

• 8 years of operations

• 98 Materials Camps have been held

• 2,360 teachers trained
Materials Camp®

UMC FALL 2009 ATTENDEES

18 OF 32 MSE DEPARTMENTS ATTENDING TODAY NOW OR IN THE PAST HOSTED AN ASM MATERIALS CAMP
Materials Camp® HOSTS

W.P.I.
RUTGERS
U. MARYLAND
U. TEXAS-DALLAS
LEHIGH
CORNELL
U. MICHIGAN
R.P.I.
U. FLORIDA
C.W.R.U
Materials Camp® HOSTS

PENN STATE
COLORADO SCHOOL OF MINES
U. TENNESSEE
U. ILLINOIS-URBANA
CARNEGIE MELLON
NORTH CAROLINA STATE
GEORGIA TECH
Materials Camp®

PHILOSOPHY

✓ LEARN BY TOUCHING

✓ GUIDED DISCOVERY

✓ NO “WRONG ANSWERS”
Materials Camp®

PHILOSOPHY

✓ EXPOSE TO APPLIED SCIENCE

✓ DO NOT ATTEMPT TO TEACH “MSE 101” CLASS
Materials Camp®

PHILOSOPHY

✓ HAVE LOTS OF FUN
✓ HAVE LOTS OF FUN
✓ HAVE LOTS OF FUN
MATERIALS CAMP

HIGH SCHOOL TEACHERS
MATERIALS CAMP® - Teachers

Participants Formal Education

• Chemistry
• Physics
• Math
• Industrial Arts (Shop)
• Computer
• Art
MATERIALS CAMP® - Teachers

Goals

• Take advantage of “Multiplier Effect”

• Teachers as MSE career advocates

• Establish full MSE course in high schools
MATERIALS CAMP® - Teachers

100 HOUR + FREE TRAINING PACKAGE

• Basic: 40+ hours
  (24 locations)

• Advanced ’2.0”: 40+ hours
  (Ohio State University.)

• Support: 20+ hours
  (Virtual / online, conferences)
MATERIALS CAMP® - Teachers

2009 IMPACT

- 24 USA locations, 8 residential format
- 6 locations in Ohio = 180 Teachers
- 720 Teachers Trained in 2009 alone
WHY TEACHERS?

• **Inspiration**: Many students become inspired to seek applied science careers through practical hands-on engagement

• **Mentorship**: High school teachers exert significant career choice influence and are gate keepers who remove perceived academic roadblocks

• **Leverage**: Reaching one teacher leads to reaching many hundreds of young people
MATERIALS CAMP® - Teachers

Total Cost (USD)

- Residential = $45 – 60K
- Local / Commuter = $15K
- Cost sharing for sustainability
Materials Camp®

COST TO UNIVERSITY TO PARTICIPATE

- $5,000 CASH (TEACHERS CAMP)
- 5 DAYS USE OF LAB / CLASSROOM
- LAB TECHNICIAN / GRAD STUDENT
MATERIALS CAMP® - Teachers

Core Faculty “Master Teachers”

• 20 + Years in Classroom Experience
• Teach High School Materials Class
• “Teachers Teaching Teachers”
MATERIALS CAMP® - Teachers Curriculum

- Materials Science and Technology Teachers Handbook,
  (Pacific Northwest National Lab Battelle Memorial Institute)

- Numerous ASM Resources
HANDS ON CONTENT

Corrosion Module

• “C-Kit” with tools & supplies
• 4 hour activity (10% of program)
• C kit provided to each teacher
• NACE Foundation Partners

NACE FOUNDATION
ADVANCING CORROSION EDUCATION PARTNER
HANDS ON CONTENT

Metal Casting Education Module

• Foundry Education Foundation Partners
• Portable melting oven with tools, supplies & DVD
• Environmentally safe
• Created by Kent State and Tri-State Universities
• OmniSource Company volunteers
MATERIALS CAMP® - Teachers

- 98 North American Locations thru 2009
- 2,360 teachers have graduated from program
MATERIALS CAMP® - Teachers

IMPACT

100% Will use in classroom

• “I can use most of these experiments right now.”
MATERIALS CAMP® - Teachers

IMPACT

100% Will use in classroom

• “I saw things that I would never have thought of using as a classroom activity.”
MATERIALS CAMP® - Teachers

IMPACT

100% More confident explaining complicated concepts

• “My level of knowledge increased so I can better assist my students.”
IMPACT

100% More confident explaining complicated concepts

• “Even though I have done some of these labs in the past, I now know how to fully explain them to my students.”
MATERIALS CAMP® - Teachers

IMPACT

100% New ideas gained

“"I got so much material and so many new ideas.""
MATERIALS CAMP® - Teachers

IMPACT

100% New ideas gained

“This would rank in the upper 10% of all workshops I have attended.”
MATERIALS CAMP® - Teachers

IMPACT

Albuquerque NM Public Schools

• “Chemistry Materials Science” approved elective

• 600+ students enrolled in 5 High School locations annually
IMPACT
Sample: High School Materials Course Title

- “Materials Science”
- “Materials Science Technology”
- “Chemistry Materials Science”
IMPACT IN HIGH SCHOOLS

A. MOST incorporate content into existing class

- 42% (181 teachers) report they are using 4 or more Materials Camp labs/demos in their classrooms

- Quite often in Chemistry class
B. Growing Number Now Teach Stand Alone Course

- **133** teachers report now or by 2010 offering semester or year-long stand alone ‘materials” course

- **19** states
STUDENT RECRUITMENT IMPACT

EXAMPLE:
NORTH CAROLINA STATE UNIVERSITY

- 5 YEARS, RESIDENTIAL FORMAT
- 15 STUDENTS
- 45% OF ALL IN-COMING FRESHMAN ARE FROM CAMP
- "SUCCESS IS IRREFUTABLE…"
- POSSIBLY EXPAND TO 2 CAMPS IN 2010
NEW
AVAILABLE TO MSE SCHOOLS

- **ROSTER** OF HIGH SCHOOL STUDENTS WHO ATTENDED A MATERIALS CAMP

- EXCELLENT STUDENT PROSPECTS

- VERY AWARE OF MSE

- AWARE OF FINANCIAL AID SUPPORT
PROGRAM SUMMARY

• 50 + YEARS OF OPERATIONS
• DIVERSE PROGRAMS
• GOAL TO ‘FILL HUMAN PIPELINE’
• VOLUNTARY CONTRIBUTIONS ENABLE ALL OPERATIONS
• 3 FULL TIME STAFF
• $12.0 MILLION RESOURCES
• $1 MILLION ANNUAL BUDGET
OTHER SERVICES

Undergraduate Design Competition

Student Chapter Grants

Podcasts

City of Materials
Under Graduate Design Competition

• Encourage design curricula in MSE
• Recognizes student teams
• 3 cash prizes + travel grants
• First Place: $2,000 prize + $500 travel + $500 to department
• Second Place: $1,500 prize + $500 travel
• Third Place: $1,000 prize + $500 travel
Under Graduate Design Competition
WINNERS 2009
#1 : Cal. State Polytechnic, Pomona
#2: Northwestern
#3: Georgia Tech
Under Graduate Design Competition

WINNERS

2008

#1 : Northwestern
#2: Boise State
#3: Cal. Polytechnic, San Luis Obispo
Under Graduate Design Competition

WINNERS 2007

#1: Northwestern
#2: Cal. Polytechnic, San Luis Obispo
#3: Montana Tech, Butte
STUDENT CHAPTER GRANTS

• BEGAN IN 2001: 39 AWARDS TO DATE

• $800 GRANT FOR OUTREACH

• 28 ‘MATERIAL ADVANTAGE’ STUDENT CHAPTERS

• TOP SCHOOLS:
  A.) NORTHWESTERN (5 AWARDS)
  B.) WASHINGTON STATE (3 AWARDS)
Under Graduate MSE Scholarships

• Began in 1953

• Many Thousands of past student recipients

• Many hold senior leadership positions in: industry, research labs, academia, ASM, ASM Foundation

• 15 awards in 2009
ASM POD CASTS

STRATEGY

TAKE THE CONTENT TO YOUNG KIDS IN A FORMAT THEY USE EVERY DAY
ASM POD CASTS

• 37 DIVERSE TOPICS NOW ON ASM WEBSITE

• MATERIALS ADVANTAGE STUDENT CHAPTER ENTRIES

• PEER-REVIEWED BY: EDUCATORS, PARENTS, ASM MEMBERS

• $500 CASH PRIZE FOR BEST TEAM

• 2 YEARS OF EFFORT TO DATE
ASM POD CASTS

12 SEPARATE MATERIALS ADVANTAGE STUDENT CHAPTERS HAVE WON $500 CASH PRIZES

TOP 3 WINNING SCHOOLS TO DATE:
1. BOISE STATE UNIVERSITY
2. UNIVERSITY OF WASHINGTON
3. ROSE HULMAN INSTITUTE
ASM PODCASTS
SAMPLE TOPICS: MIDDLE SCHOOL KIDS

Ductility
Elasticity
Electric Properties
Energy
Extractive Metallurgy
Extrusion
Failure Analysis
Fatigue
Footwear
Forging
Fractures
Glass
Heat Treating
Joining
Lavatory fixtures
Magnetic
Materials Analysis
Materials Engineering
Materials Types
Melting Point
Melting Temperature
Metals
STRATEGIC PLAN
“Picking Up the Pace” ("PUP")

- DOUBLE NUMBER OF TEACHER CAMPS IN NEXT 5 YEARS
- EXPAND FROM 24 TO 50 ANNUAL LOCATIONS
- TRAIN 1,500 HIGH SCHOOL TEACHERS EACH YEAR
Investment Earnings

Pay All Overhead Costs

• **100%** of all contributions used to directly impact young adults

• **No** administrative or overhead costs

• **Unique situation**, few Foundations can claim
CONTACT

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